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(6) NEW FORMS OF THE EXAMEN CALIFICACIÓN DE FUERZAS ARMADAS--PREPARATORY STUDIES

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NEW FORMS OF THE EXAMEN CALIFICACION DE FUERZAS ARMADAS--PREPARATORY STUDIES

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FOREWORD

The INPUT QUALITY Task conducts a continuing research program on screening and induction techniques. Objectives are (1) to improve the system for screening potential enlisted input so as to identify and reject more effectively those who are not readily trainable and usable in the service; (2) to aid in manpower planning by developing methods for estimating the mental abilities of the civilian pool available for service under various conditions; and (3) to develop technical information for use in consultative assistance to staff agencies responsible for procurement and standards policies.

The entire research Task is responsive to special requirements of the Deputy Chief of Staff for Personnel, as well as to requirements to contribute to achievement of the objectives of RDT&E Project 2J024701A722, "Selection and Behavioral Evaluation", FY 1967 Work Program. The present Research Study, conducted at the request of the Office of the Assistant Secretary of Defense for Manpower, reports on a portion of Subtask h, "Development and evaluation of new input screening and allied instruments". In this connection, considerations regarding the processing of insular Puerto Rican Selective Service registrants required reexamination of the need for continued use of a screening test in the Puerto Rican idiom of Spanish.

J. E. UHLANER, Director
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NEW FORMS OF THE EXAMEN CALIFICACION DE FUERZAS ARMADAS--PREPARATORY STUDIES

BRIEF

Requirement:

To determine whether there is still need for the Examen Calificación de Fuerzas Armadas (ECFA), the screening test in Puerto Rican Spanish used to determine whether non-English-speaking insular Puerto Ricans meet mental standards of the Armed Services. If so, to find what resources are available in Puerto Rico for developing new forms of the ECFA under contract, and to state requirements which should be included in any contract negotiated.

Procedure:

The extent to which Spanish continues to be the language in general use in Puerto Rico was explored, with special reference to the age group from which potential inductees are drawn. Data on results of pre-induction testing with ECFA and with the Armed Forces Qualification Test (AFQT) were analyzed for indications of current trends. Institutions in Puerto Rico which appeared to have capabilities for developing new forms of the ECFA were identified and requirements for the test were discussed with appropriate personnel. Test characteristics to be specified were developed on the basis of data in BESRL.

Conclusions:

Spanish continues to be the dominant language of the Commonwealth of Puerto Rico. While most recent high school or college graduates have had exposure to English, their command of the language is in most cases insufficient to enable them to provide an accurate measure of their ability on an English language test. Without the safeguard of such a measure, there is a distinct possibility that individuals may be accepted on the basis of education or partly chance AFQT score who are not capable of absorbing military training or of functioning in an Army job. Therefore, a Spanish language screening test is still needed to determine level of aptitude of prospective inductees who do not have a good working knowledge of English.

Two institutions in Puerto Rico, the Division of Evaluation, Puerto Rico Department of Education, and the Puerto Rico division of the College Entrance Examination Board have the professional capabilities for developing new forms of the tests.

Any contract negotiated should provide for the complete test development cycle, including

1. Construction of new experimental items for the three content areas--vocabulary, arithmetic reasoning, and spatial--at least twice as many items as will be used in the final forms.

2. Administration of experimental items to an appropriate item-analysis sample and selection of items for standardization forms.

3. Administration of new forms plus a reference test to independent samples to determine equivalence of alternate forms and establish conversion tables tied back to the reference test.

NEW FORMS OF THE EXAMEN CALIFICACION DE FUERZAS ARMADAS--PREPARATORY STUDIES

The induction of enlisted personnel on the island of Puerto Rico has been a matter of special consideration since the inception of the Selective Service System during World War II. The population of the island is quite large, coming close to the median for the fifty states. Puerto Rico is, in fact, the only large area of the nation in which the native language is not English. Many men eligible for service, therefore, do not have sufficient command of English to be fully usable in English-speaking units.

Since the period of the Korean War, personnel management policy has required Army-wide assignment of Puerto Rican enlisted men. Consequently, it has been necessary for those accepted to be able to understand at least a modicum of English. There has also been a requirement for induction of Puerto Ricans who have the potential to make good soldiers and who in a short time can be taught sufficient English to be sent on to basic training in the continental United States. Until early in 1966, those insular Puerto Ricans accepted for induction who did not meet literacy standards in English were given special training in English, with emphasis on oral use of the language. Only after they qualified on minimum standards in English were they sent forward to basic combat training in English-speaking units. Those who, after literacy training, could not meet the language requirement were discharged. The special training was abolished in 1966, and only those who could meet minimum standards in English were accepted for induction.

To implement these policies, adequate testing instruments in Spanish were required. The Armed Forces Qualification Test, developed and standardized on an English-speaking continental United States sample, is an appropriate selection test so long as the objective is to select, at relatively high standards, only men sufficiently competent in English to profit from service training programs conducted in English. Note that, for all the Armed Services, procedures for regular enlistment were the same as in the continental United States, all testing and processing being in English with generally higher standards than for induction. The number accepted under this standard is negligible. The Examen Calificación de Fuerzas Armadas, a Spanish-language test developed and standardized to yield estimates of the military trainability of insular Puerto Ricans, was introduced for screening purposes in October 1953. ECFA-1 was shown in subsequent research to be useful in predicting achievement in use of English as well as performance in basic combat training.[1] It was also effective in selecting insular Puerto Ricans who demonstrated satisfactory performance in duty

[1] Schenkel, K. F., Leedy, H. B., Rosenberg, N., and Mundy, J. B. Evaluation of the Puerto Rican Screening Test (ECFA) against success in training. BESRL Technical Research Report 1097. January 1957.

assignment four months after completion of basic training.[2] New forms (ECFA-2 and ECFA-3) were introduced in 1959. Need for a measure of ability in English was met by development of the English Fluency Battery, introduced in 1954.

Thus, at the beginning of 1967, the mental screening of insular Puerto Rican Selective Service registrants whose primary language was the local idiom involved, first, testing with the ECFA to determine level of aptitude for training and then screening on the English Fluency Battery to determine ability to understand English. Finally, the Army Classification Battery was used to determine usable specific aptitudes. The ECFA procedure qualifies somewhat larger proportions of registrants than would direct application of CONUS procedures.

In view of the length of time that ECFA-2 and ECFA-3 have been in operational use, the development of new forms is in order if the test continues to be used operationally. Before undertaking to develop new forms, however, it was considered desirable to reexamine the need for such an instrument in the light of current military policy, and particularly to determine whether increased emphasis on the teaching of English in elementary and high schools, initiated during the 1950's, had resulted in significant numbers of young men for whom an English language test would be suitable.

PURPOSE

The study reported here was undertaken to examine conditions pertaining to the development of new alternate forms of the ECFA. The study, requested by the Office of the Assistant Secretary of Defense, Manpower, had a threefold objective: (1) to determine whether such a test is still needed, (2) to find whether personnel capable of developing new forms of the test under contract are available in Puerto Rico, and (3) to outline test development requirements that should be included in any contract negotiated.

PROCEDURE

Information on language conditions in Puerto Rico and on current induction and selection practices were obtained through several channels. Results of current testing furnished by the Puerto Rican Armed Forces Entrance and Examining Station were analyzed for indications of the operational usefulness of the ECFA. A research scientist of the Behavioral Science Research Laboratory made a trip to Puerto Rico to interview potential contractors. Names of research-oriented individuals in Puerto Rico

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[2] Schenkel, K. F., Meyer, L. A., Rosenberg, N., and Bayroff, A. G. Evaluation of the Puerto Rican Screening Test (ECFA) against success on the job. BESRL Technical Research Report 1106. June 1957.

who might provide information in this regard were furnished by Dr. Pablo Roca, now in the office of the Organization of American States. Dr. Roca had participated in the construction of ECFA-2 and ECFA-3 when in the Puerto Rico Department of Education. Lastly, data on the test characteristics of current ECFA forms were organized to provide a practicable basis for development of new forms comparable in range and coverage to those now in use.

CONTINUED NEED FOR THE ECFA

USE OF ENGLISH AMONG INSULAR PUERTO RICANS

Spanish continues to be the principal language of Puerto Rico. The bulk of the population has negligible fluency in English. In everyday living there seem to be few requirements for communication in English. English-speaking personnel are not encountered in any numbers except in businesses dealing with companies based in the continental United States or engaged in some form of the tourist trade. The scarcity of personnel fluent in English is reflected in the higher salaries offered for jobs requiring command of English. The major newspapers are printed in Spanish and most television and radio programs are in Spanish. All normal conversation and activities are carried on in the Puerto Rican idiom of Spanish. From an interpersonal relations standpoint, primary mental testing in the native language would seem to be more acceptable to the insular Puerto Rican registrant than would testing administered wholly in English. Testing only in English might seem to be an invitation to evade service.

There appears at present to be no reason to expect any significant increase in the use of English among the people. True, English is taught as the preferred foreign language in the schools. Through the secondary grades, from two to five hours a week are devoted to the study of English as a foreign language. The effect of this training, however, is extremely variable. There is indication that private schools provide better trained graduates than does the public school system. Since the private schools charge significant tuition ($20 or $30 dollars a month), the students sent to these schools come from families in the stronger socio-economic positions. It is estimated that the private schools provide about 20 percent of the island's high school graduates. On the basis of competitive examinations, however, these graduates constitute about 50 percent of those admitted to the University of Puerto Rico. These effects extend to the learning of English. Thus, command of English would on the average be greater among graduates of private schools than of public schools and among the relatively small number of men with education beyond high school level.

In contrast, a considerable proportion of the youth drop out of school after completion of junior high school. Puerto Rican schools follow the 6-3-3 system. After the ninth year, boys and girls are usually old enough to get working papers and undertake full-time employment. As a consequence, for many, training in English is limited. In any case, effects may soon be lost as the individual becomes part of the working population.

TRENDS SHOWN BY AFEES TESTING

For registrants who can be tested wholly in English, procedures are somewhat simpler than for men who must be tested initially in Spanish. Registrants who score between the 10th and 30th percentiles on the AFQT take the Army Qualification Battery to find whether they meet the special aptitude requirements. For these men, AFEES procedures correspond exactly to those in effect in the continental United States.

For Spanish-speaking registrants who must be tested initially with the ECFA, there is further mental screening to identify those who can be sent directly to the continental United States for basic training. The English Fluency Battery, plus the Army Classification Battery, is given to all Spanish-speaking registrants, regardless of ECFA score.

It is thus desirable to start with the AFQT anyone whose background suggests adequate command of English. Registrants appearing for examinations are interviewed briefly by the noncommissioned officer in charge to spot those who know English and can be given the AFQT. Under this practice, more registrants take the AFQT than strict interpretation of the regulations would indicate. Even so, several times as many registrants are given the ECFA as are given the AFQT.

The complex effects of differentiated schooling and home environment, as well as cultural factors affecting the draft-age population, are illustrated in figures on a small sample of inductees recently processed in Puerto Rico. Considering only elementary and high school attended, of the group processed by administration of AFQT, 60 percent had attended public school only, 40 percent had attended private schools all or part of the time. Corresponding figures for the group administered ECFA were 90 percent and 10 percent.

Among the AFQT processees, about 15 percent of those who had attended only public school achieved scores at the 50th percentile in comparison to 40 percent of those who had attended private school. Among those processed by administration of ECFA, the differential rested in whether or not registrants had attended high school. For a small group who had attended elementary public school and had not gone to high school, 10 percent achieved the qualifying raw score of 60 on ECFA, whereas of those who had attended high school, more than 50 percent met the qualifying score.

These analyses support the conclusion that a test in Spanish such as the ECFA should be provided so long as it is desired to obtain an effective estimate of the level of general aptitude of registrants whose primary language is Puerto Rican Spanish. The ECFA procedure can avert failure to distinguish the insular Puerto Rican registrant who is basically trainable but who does not know much English from the registrant who has a much lower level of ability. The AFQT does not provide the basis for such a distinction, since registrants in both categories might get near-chance scores. Discrimination of this kind provides flexibility for the Army personnel

system, enabling it better to meet changes in induction and manpower utilization standards and policies. A by-product advantage of the present ECFA procedure is that the Army is less likely to induct a man who is completely illiterate in English but who would qualify on the AFQT by virtue of his performance on the nonverbal items and a chance score on the other items a little better than the chance mean.

POTENTIAL CONTRACTORS FOR DEVELOPING THE TESTS

To investigate the possibilities of having new forms of the ECFA developed under contract by an insular Puerto Rican organization, the BESRL research scientist contacted the following individuals in Puerto Rico:

Dr. Charles O. Hamill, Director, Division of Evaluation, Department of Education, Puerto Rico

Dr. Jorge J. Dieppa, Director, Puerto Rico Office, College Entrance Examination Board

Dr. Miguelina N. Hernandez, Chairman, Department of Psychology, Inter-American University of Puerto Rico

Lt. Col. Wayne A. Patrick, Commanding Officer, Puerto Rico AFEES

Two organizations in Puerto Rico were found to have the capabilities for developing the new tests for the Department of Defense--the Division of Evaluation of the Department of Education and the Puerto Rico office of the College Entrance Examination Board. Both organizations have experience with test development problems and a high order of professional interest and technical ability. The Division of Evaluation in the Department of Education has the advantage of access to samples of school children for initial administration of experimental test items.

TEST REQUIREMENTS

Current forms of the ECFA contain items in three content areas--vocabulary, arithmetic reasoning, and spatial relations. The spatial relations subtest consists of block counting items like those in the early Army General Classification Test. In fact, when ECFA forms 2 and 3 were developed, only the vocabulary and arithmetic reasoning subtests were new, the block counting items being carried over from ECFA-1. A pertinent observation is that the Division of Evaluation has included in its test development activities research on surface development items to test spatial relations abilities. This type of item is much more closely related to the spatial relations measures of the AFQT and classification batteries of the Armed Services than the block counting item.

A contract for the development of new ECFA forms should specify items in three content areas--vocabulary, arithmetic reasoning, and spatial relations in surface development form.

With the professional resources found to be available in Puerto Rico, consideration should be given to contracting for the total test development package, with specification as follows:

CONSTRUCTION OF NEW ITEMS

At least twice as many items as will be needed for the final forms should be written and reviewed. All items should be new, not selected from existing tests or item files. With qualified test specialists handling the development, it is recommended that the length of each test in final form be reduced to 75 items, 25 of each type. Thus, for two forms the item pool should be 300 items, 100 of each type, all in four-alternative multiple-choice format. These items should tap the prescribed range of item difficulties.

From review of BESRL's files, data on the characteristics of items selected for ECFA-2 and ECFA-3 have been extracted and are presented as Tables 1 through 4. Benchmark items from these forms, with their characteristics, will be furnished the contractor. The prescribed range of item difficulties and the target distribution of items for each content area in each form should be:

Raw p-value:	30-39	40-49	50-59	60-69	70-79	80-89	90-99
Number of items	1	3	5	7	5	3	1

EXPERIMENTAL ADMINISTRATION OF ITEM POOLS

The second phase will involve experimental tryout of the experimental items and the benchmark items on a sample of individuals who would provide a reasonably wide range of ability. A combination of twelfth grade and ninth grade males in Puerto Rico public schools would be a satisfactory sample for the item-analysis run. Data obtained would be item analyzed to determine the difficulty value for each item, the correlation of each item with total score for items in the same content area, and the correlation of each item with total scores for items in each of the other two content areas. Based on the results, items would be selected for two forms of the ECFA. Selection would be based primarily on meeting the desired distribution of difficulty values, with selection on the basis of correlation where there are more items at a given difficulty value level than are needed for the test.

STANDARDIZATION AND EQUIVALENCE STUDIES

The third phase would involve administration of the selected items for determination of norms and intercorrelations. For each form, a sample would be needed which would be given the new form and a reference test--which might well be ECFA-2. A third sample should be given the two new forms of the test only. Data from these samples will be analyzed to determine equi-percentile equivalence of raw scores on the new test and scores on the reference test as well as correlation between new and reference tests. The third sample would provide the correlation between the two new forms of the test.

Table 1

P-VALUES AND CORRELATIONS[a] FOR VERBAL ITEMS SELECTED FOR ECFA-2

Item No.	P-Value	r	Item No.	P-Value	r
1	.81	.80	46	.53	.81
2	.74	.80	47	.53	.74
3	.73	.92	48	.53	.66
4	.72	.80	49	.52	.58
5	.70	.76	50	.46	.79
16	.68	.84	61	.46	.77
17	.67	.74	62	.45	.75
18	.62	.71	63	.44	.68
19	.61	.83	64	.43	.66
20	.61	.69	65	.41	.73
31	.61	.52	76	.40	.73
32	.59	.80	77	.38	.57
33	.55	.83	78	.35	.65
34	.54	.72	79	.29	.79
35	.54	.53	80	.25	.64

[a]P-values were corrected for guessing through use of the formula, Rights - 1/3 Wrongs, based on there being 4 alternatives per item. The coefficients are tetrachoric correlations between passing or failing an item and a high or low part-score on like type items of ECFA-1.

Table 2

P-VALUES AND TETRACHORIC CORRELATIONS[a] FOR ARITHMETIC ITEMS SELECTED FOR ECFA-2

Item No.	P-Value	r	Item No.	P-Value	r
6	.82	.84	51	.53	.79
7	.76	.91	52	.53	.66
8	.75	.83	53	.52	.82
9	.74	.59	54	.51	.78
10	.72	.65	55	.47	.75
21	.68	.72	66	.45	.68
22	.66	.81	67	.44	.78
23	.65	.80	68	.43	.63
24	.63	.83	69	.42	.73
25	.62	.78	70	.41	.75
36	.60	.80	81	.39	.68
37	.58	.87	82	.38	.65
38	.56	.76	83	.34	.59
39	.54	.83	84	.32	.73
40	.54	.79	85	.24	.75

[a]See footnote to Table 1.

Table 3

P-VALUES AND TETRACHORIC CORRELATIONS[a] FOR VERBAL ITEMS SELECTED FOR ECFA-3

Item No.	P-Value	r	Item No.	P-Value	r
1	.83	.82	46	.49	.61
2	.79	.80	47	.47	.77
3	.76	.80	48	.46	.60
4	.72	.80	49	.42	.66
5	.71	.83	50	.42	.66
16	.70	.79	61	.41	.55
17	.63	.82	62	.40	.71
18	.62	.85	63	.40	.71
19	.62	.70	64	.40	.66
20	.62	.66	65	.40	.50
31	.55	.51	76	.32	.71
32	.54	.81	77	.32	.33
33	.54	.51	78	.30	.71
34	.52	.78	79	.30	.61
35	.52	.58	80	.26	.66

[a]See footnote to Table 1.

Table 4

P-VALUES AND TETRACHORIC CORRELATIONS[a] FOR ARITHMETIC ITEMS SELECTED FOR ECFA-3

Item No.	P-Value	r	Item No.	P-Value	r
6	.81	.85	51	.53	.76
7	.78	.83	52	.51	.78
8	.74	.70	53	.50	.79
9	.73	.79	54	.50	.78
10	.73	.78	55	.50	.77
21	.69	.81	66	.47	.69
22	.66	.80	67	.46	.81
23	.66	.78	68	.45	.75
24	.66	.60	69	.41	.75
25	.60	.82	70	.38	.72
36	.60	.80	81	.37	.64
37	.58	.77	82	.35	.68
38	.56	.75	83	.34	.67
39	.55	.73	84	.33	.81
40	.53	.77	85	.24	.62

[a]See footnote to Table 1.